

CLAIMS

What is claimed is:

1. A graphic protection element of banknotes, securities, documents which consists of: the printed encoded image containing the encoded information about the original image and which is generated by global replacement of each level of the multilevel original image with the matrix of cells which has an ordered aperiodic structure of high resolution; the printed key of the encoded image which is intended for its decoding and is formed, at least, from one matrix of cells of this ordered aperiodic structure, inversely printed on the other side of the protected object and precisely matched with the encoded image therewith in reflected light encoding matrices of cells on both sides of the protected object are visually similar and are perceived as neutral gray or color homogeneous background, and in transmitted light the visible image of the graphic element, which color may differ from visible colors of the encoded image and the key, is observed.
2. A graphic element according to claim 1 in which the printed encoded image and the printed key of the encoded image are 2-dimensional matrices of binary cells.
3. A graphic element according to claim 1 in which printed encoded image is superimposed over the printed key of the encoded image to form the visible image of a graphic element.
4. A graphic element according to claim 1 in which the encoded image includes additional encoded images, which are decoded by a separately printed additional key.

5. A graphic element according to claim 1 in which the same key is used for decoding different encoded images of the graphic element.
6. A method of manufacturing of a graphic element for protection of banknotes, securities, documents, the method consisting of encoding, i.e. encoded image and its key image are formed on the basis of original image using special software, which converts an original image into multilevel graphic image whose each level is globally replaced with corresponding matrix of cells of the ordered aperiodic structure.
7. A method according to claim 6 in which the encoded image and its key may have different dimensions.
8. A method according to claim 6 in which matrices of cells of the ordered aperiodic structure are built using the Kronecker product method from basis orthogonal Hadamard matrices of dimension 4×4 or more, in which 50% of elements are equal to $+1$ and 50% of elements are equal to -1 , with the further rearrangement of rows, columns or separate fragments of a matrix of cells for forming different types of encoding structures.
9. A method according to claim 6 in which two-level graphic encoded image is formed using replacement of both levels of the original graphic image with matrix of cells of complementary ordered aperiodic structures of 50% area coverage.
10. A method according to claim 6 in which area coverage of a matrix of cells of the two-level encoded image is reduced by withdrawal of the certain part of dark cells to form enlightened encoded image.

11. A method according to claim 6 in which the three-level graphic encoded image is formed by replacement of two levels of original graphic image with matrix of complementary cells, and the third level of the original graphic image is replaced with matrix of cells of partially complementary ordered aperiodic structure.

12. A method according to claim 6 further including the step of printing, i.e. encoded image is printed on object of protection, and the key of the encoded image is printed inversely on the other side of the protected object, precisely matching the encoded image.

13. A method according to claim 12 in which the encoded image is printed in color inks on the protected object with certain angular orientation.

14. A method according to claim 12 in which the encoded image and its key are printed with resolution which is greater and not multiple to resolution of copiers.

15. A method according to claim 12 in which the encoded image and its key are printed in special color printing inks of two complementary colors.

16. A method according to claim 12 in which the encoded image and its key are printed in special color printing inks of partially complementary colors.

17. A method according to claim 12 in which the encoded image is printed in a color printing ink reflecting light in one of three ranges of visible spectrum, on color background which reflects light in two other ranges of

visible spectrum and the key is printed in color or neutral gray ink composed of synthesis colors.

18. A method according to claim 12 in which the encoded image is printed in a color printing ink reflecting light in one of three ranges of visible spectrum on white background and the key is printed in a color ink reflecting light in another range of visible spectrum on white background.

19. A method according to claim 12 in which the encoded image and its key are printed on background of the visible unilateral combined graphic image to form additional elements of the visible image, special marks or symbols for additional protection.

20. A method according to claim 12 in which the encoded image and its key are printed on a background of the visible bilateral combined graphic image to form additional elements of the visible image, special marks or symbols for additional protection.

21. A method according to claim 12 in which the encoded image and its key are printed on a paper with a light watermark which is additionally processed by an agent to increase of its transparency.

22. A method according to claim 12 in which the encoded image and its key are printed on a film.